
Cell Cycle Regulation by microRNAs in Stem Cells.

Journal:	Results Probl Cell Differ
Publication Year:	2011
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PubMed link:	21630156
Funding Grants:	Mechanisms of small RNA regulation in early embryonic development, MicroRNA Regulation of Human Embryonic Stem Cell Self-Renewal and Differentiation, Training Grant I

Public Summary:

MicroRNAs are short RNA molecules that do not encode for proteins but rather regulate the production of proteins from messenger RNAs. Importantly, microRNAs have been implicated in a broad range of stem cell roles in both healthy and diseased tissues. MicroRNAs show great promise as both biomarkers and therapeutics for disease. Here, we review how microRNAs regulate cell cycle, a critical property of how cells proliferate. Manipulating cell cycle to enhance stem/progenitor cell proliferation in degenerative diseases and suppress proliferation in cancer will be of great therapeutic value.

Scientific Abstract:

The ability to self-renew and to differentiate into at least one-cell lineage defines a stem cell. Self-renewal is a process by which stem cells proliferate without differentiation. Proliferation is achieved through a series of highly regulated events of the cell cycle. MicroRNAs (miRNAs) are a class of short noncoding RNAs whose importance in these events is becoming increasingly appreciated. In this chapter, we discuss the role of miRNAs in regulating the cell cycle in various stem cells with a focus on embryonic stem cells. We also present the evidence indicating that cell cycle-regulating miRNAs are incorporated into a large regulatory network to control the self-renewal of stem cells by inducing or inhibiting differentiation. In addition, we discuss the function of cell cycle-regulating miRNAs in cancer.

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